Ebola: From Africa to Arizona

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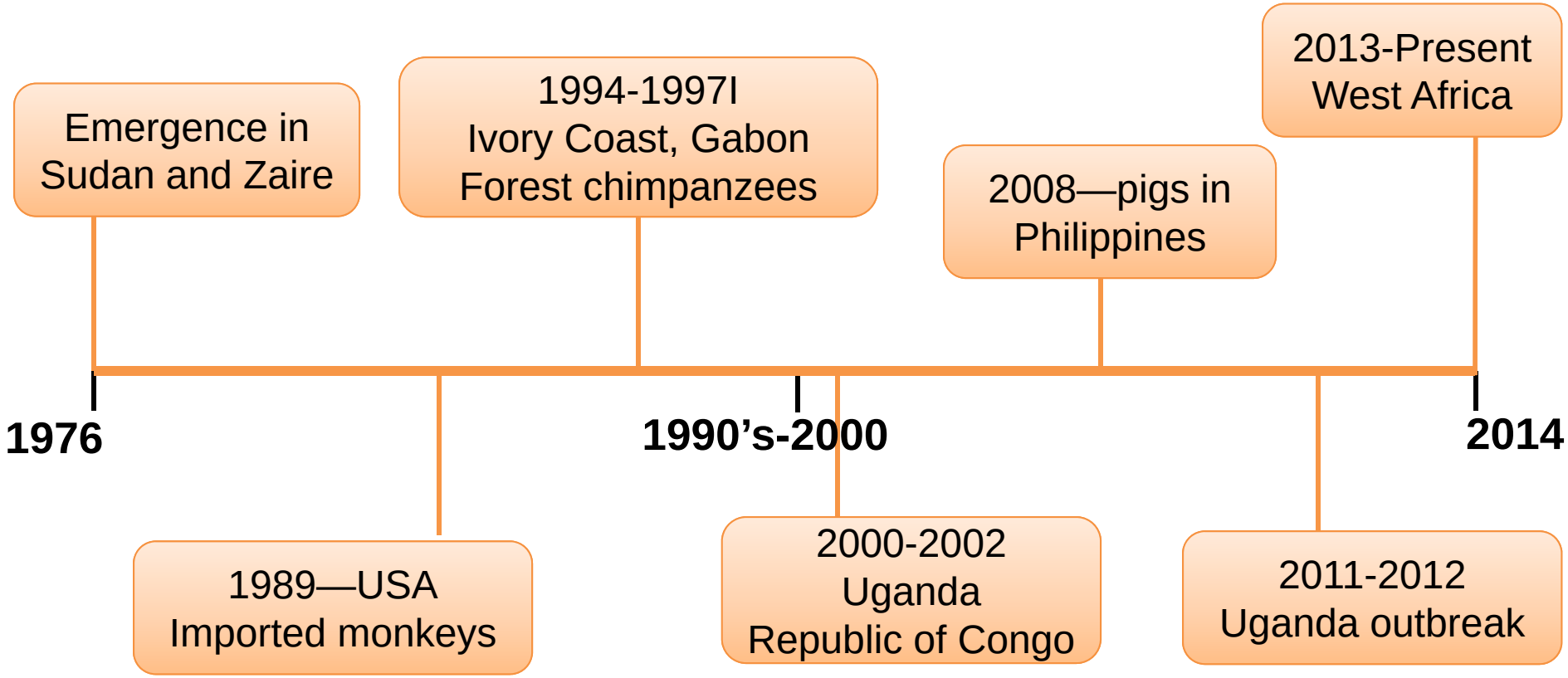
- Largest Ebola epidemic in history
- Largest international outbreak response in CDC's history
- Current case fatality rate is 51%

http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/distribution-map.html

Ebola in the Past



2014 Ebola Outbreak

- 8973 total cases, 4484 deaths (as of 10/18/14)
  - Guinea: 1472 cases, 843 deaths
  - Liberia: 4249 cases, 2458 deaths
  - Sierra Leone: 3252 cases, 1183 deaths
- Localized or Travel Associated Transmission
  - Nigeria: 20 cases, 8 deaths DECLARED EBOLA FREE (10/17/14)
  - Senegal & Span: 1 case each, 0 deaths
  - United States: 3 cases, 1 death

Arizona Department of Health Services

Health and Wellness for all Arizonans

azdhs.gov

Overall Goals in Outbreak Response

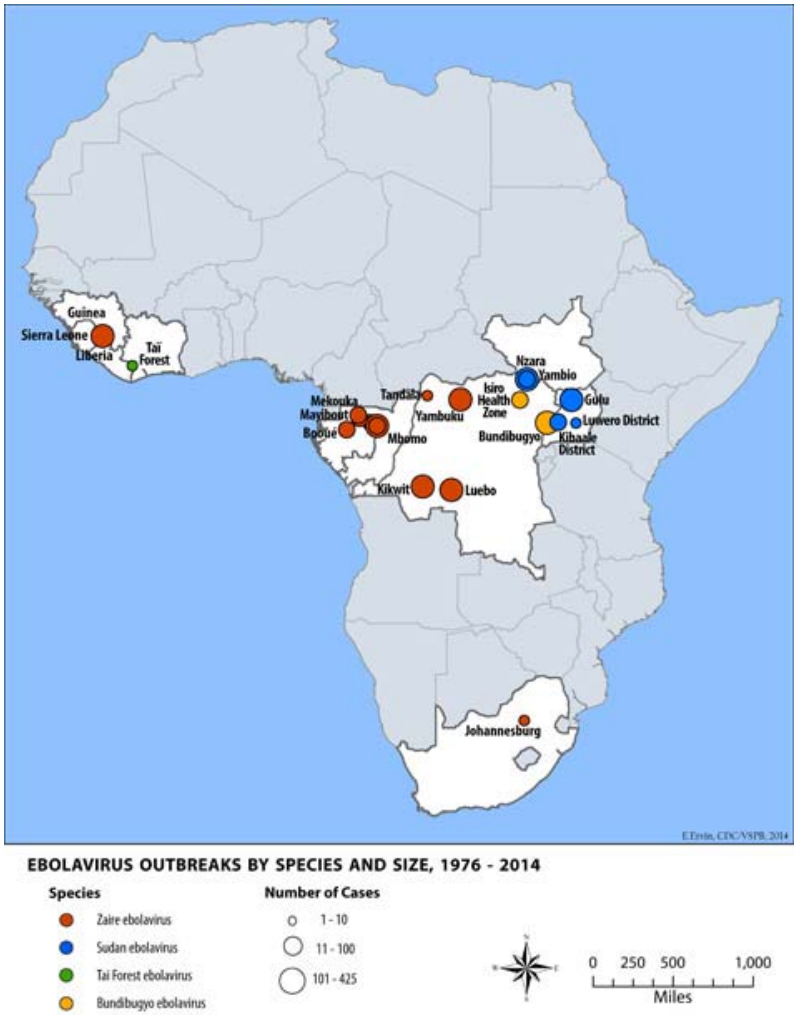
- Patient Care
  - Experienced & trained staff
  - Appropriate personal protective equipment (PPE)
- Transmission
  - Case identification
  - Contact tracing
  - Infection control
- Community Education
  - Fact sheets, posters, pamphlets, social media messaging

Case of Ebola in the US

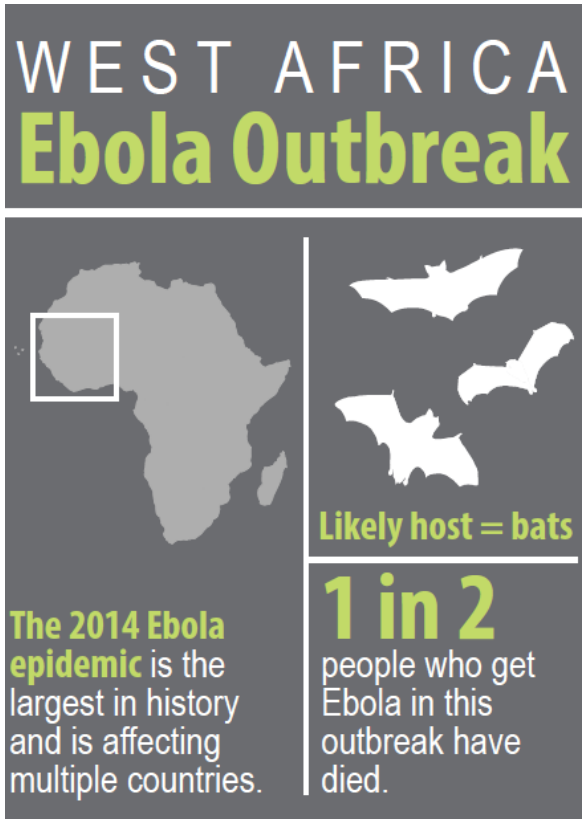
- First case diagnosed in Dallas, TX
  - Travel associated, but no symptoms when case left Liberia
  - Admitted to hospital on September 28 and died October 8
  - Close contacts monitored daily for 21 days after exposure
- Two nurses who had contact with index case tested positive for virus
  - Contact was when index case was at highest point of infection
  - Isolated and transported to other US facilities for care
  - Close contacts monitored daily for 21 days after exposure

What is Ebola?

- First discovered in 1976 in Democratic Republic of the Congo
- Sporadic outbreaks occur in Africa
- Family of zoonotic RNA viruses
  - *Filoviridae*
- 5 species of ebolavirus
  - Zaire (current outbreak)
  - Sudan
  - Tai Forest
  - Bundibugyo
  - Reston



What is Ebola?



- Causes disease in human, monkeys, and apes (chimpanzees and gorillas)
  - Reston ebolavirus is the only species not known to cause disease in humans
- Natural reservoir is unknown
  - Currently believed to be bats
- Category A agent regulated by DOT Hazardous Materials Regulations

Ebolavirus Ecology

Enzootic Cycle

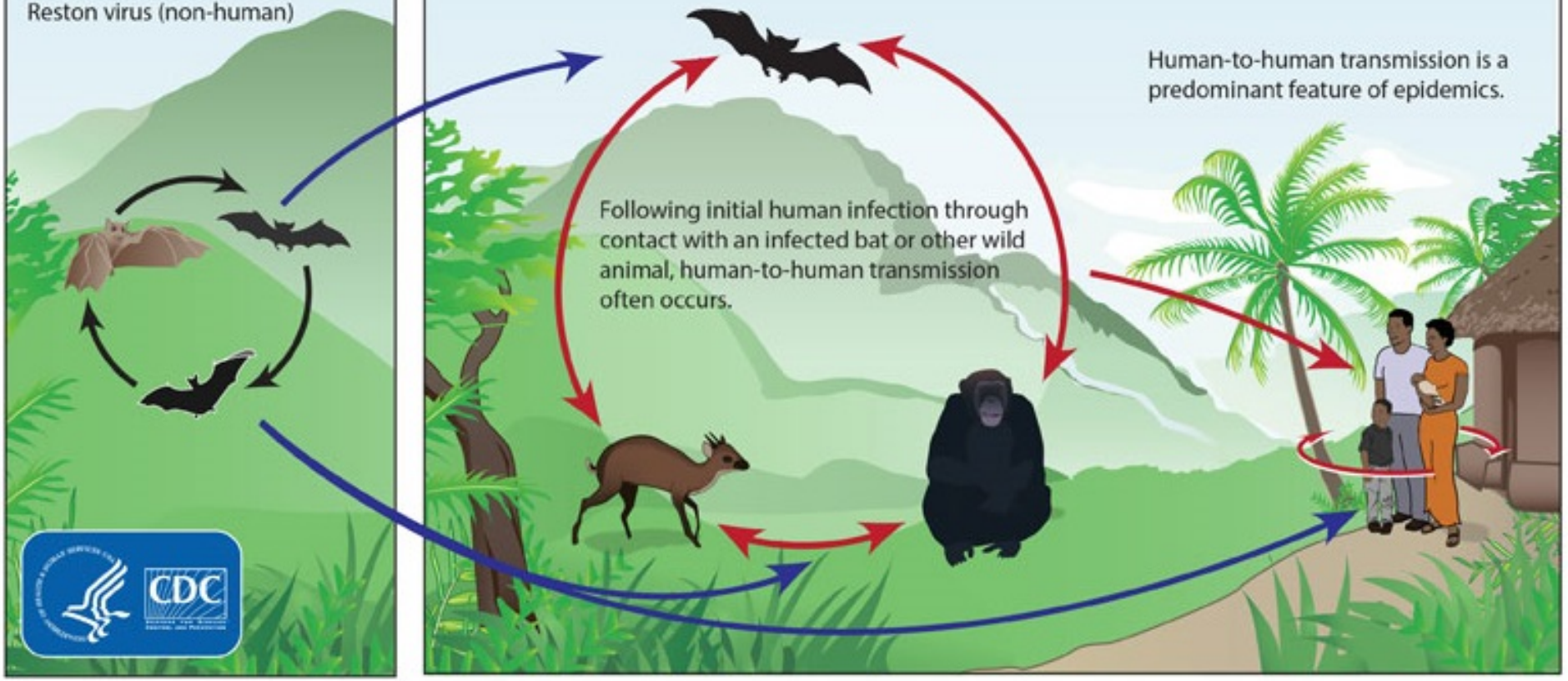
New evidence strongly implicates bats as the reservoir hosts for ebolaviruses, though the means of local enzootic maintainance and transmission of the virus within bat populations remain unknown.

Ebolaviruses:

Ebola virus (formerly Zaire virus)
Sudan virus
Taï Forest virus
Bundibugyo virus
Reston virus (non-human)

Epizootic Cycle

Epizootics caused by ebolaviruses appear sporadically, producing high mortality among non-human primates and duikers and may precede human outbreaks. Epidemics caused by ebolaviruses produce acute disease among humans, with the exception of Reston virus which does not produce detectable disease in humans. Little is known about how the virus first passes to humans, triggering waves of human-to-human transmission, and an epidemic.



Transmission

- Spread though direct contact with:
  - Blood or body fluids of an infected person
  - Urine, feces, saliva, sweat, vomit, semen
  - Contaminated objects (e.g. needles and syringes)
  - Infected animals (e.g. meat or body fluids)

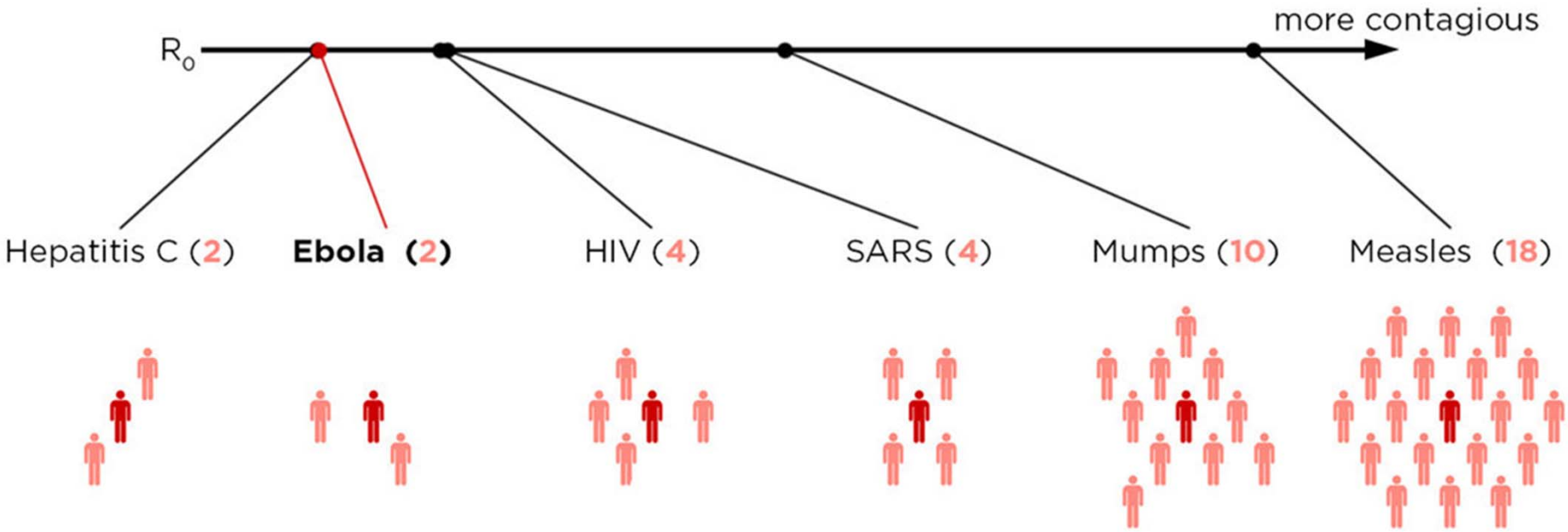
- NOT spread by:
  - Mosquitos or other vectors
  - Air
  - Food or water

Transmission

- Ebola can only be spread after a person becomes symptomatic
- Incubation period is 2-21 days
  - Average is 8-10 days
- Control measures to prevent exposure are key

How contagious is Ebola?

The number of **people** that **one sick person** will infect (on average) is called R_0.
Here are the maximum R_0 values for a few viruses.



General Symptoms

- ❑ Fever (greater than 38.0°C or 100.4°F) **OR**
- ❑ Severe headache
- ❑ Weakness
- ❑ Muscle pain
- ❑ Vomiting
- ❑ Diarrhea
- ❑ Abdominal pain
- ❑ Unexplained hemorrhage

Evaluating Patients & Returning Travelers

- CDC has released tools
  - Algorithm for evaluating returned travelers for Ebola
  - Checklist for patients being evaluated for Ebola in the US

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Checklist for Patients Being Evaluated for Ebola Virus Disease (EVD) in the United States

Upon arrival to clinical setting/triage

- ❑ Assess the patient for a fever (subjective or ≥ 100.4°F / 38.0°C)
- ❑ Determine if the patient has symptoms compatible EVD such as headache, weakness, muscle pain, vomiting, diarrhea, abdominal pain or hemorrhage
- ❑ Assess if the patient has a potential exposure from traveling to a country with widespread Ebola transmission* or having contact with an Ebola patient in the 21 days before illness onset
  Suspect Ebola if fever or compatible Ebola symptoms and an exposure are present
  See next steps in this checklist and the Algorithm for Evaluation of the Returned Traveler for Ebola at http://www.cdc.gov/vhf/ebola/pdf/ebola-algorithm.pdf

Upon initial assessment

- ❑ Isolate patient in single room with a private bathroom and with the door to hallway closed
- ❑ Implement standard, contact, & droplet precautions
- ❑ Notify the hospital Infection Control Program at _____
- ❑ Report to the health department at _____

Conduct a risk assessment for:
High-risk exposures

- ❑ Percutaneous (e.g., needle stick) or mucous membrane exposure to blood or body fluids from an EVD patient
- ❑ Direct skin contact with skin, blood or body fluids from an EVD patient
- ❑ Processing blood or body fluids from an EVD patient without appropriate PPE
- ❑ Direct contact with a dead body in an Ebola-affected area without appropriate PPE

Low-risk exposures

- ❑ Household members of an EVD patient or others who had brief direct contact (e.g., shaking hands) with an EVD patient without appropriate PPE
- ❑ Healthcare personnel in facilities with EVD patients who have been in care areas of EVD patients without recommended PPE

Use of personal protective equipment (PPE)

- ❑ Use a buddy system to ensure that PPE is put on and removed safely

Before entering patient room, wear:

- ❑ Gown (fluid resistant or impermeable)
- ❑ Facemask
- ❑ Eye protection (goggles or face shield)
- ❑ Gloves

If likely to be exposed to blood or body fluids, additional PPE may include but isn't limited to:

- ❑ Double gloving
- ❑ Disposable shoe covers
- ❑ Leg coverings

Upon exiting patient room

- ❑ PPE should be carefully removed without contaminating one's eyes, mucous membranes, or clothing with potentially infectious materials
- ❑ Discard disposable PPE
- ❑ Re-useable PPE should be cleaned and disinfected per the manufacturer's reprocessing instructions
- ❑ Hand hygiene should be performed immediately after removal of PPE

During aerosol-generating procedures

- ❑ Limit number of personnel present
- ❑ Conduct in an airborne infection isolation room
- ❑ Don PPE as described above except use a NIOSH certified fit-tested N95 filtering facepiece respirator for respiratory protection or alternative (e.g., PAPR) instead of a facemask

Patient placement and care considerations

- ❑ Maintain log of all persons entering patient's room
- ❑ Use dedicated disposable medical equipment (if possible)
- ❑ Limit the use of needles and other sharps
- ❑ Limit phlebotomy and laboratory testing to those procedures essential for diagnostics and medical care
- ❑ Carefully dispose of all needles and sharps in puncture-proof sealed containers
- ❑ Avoid aerosol-generating procedures if possible
- ❑ Wear PPE (detailed in center box) during environmental cleaning and use an EPA-registered hospital disinfectant with a label claim for non-enveloped viruses**

Initial patient management

- ❑ Consult with health department about diagnostic EVD RT-PCR testing***
- ❑ Consider, test for, and treat (when appropriate) other possible infectious causes of symptoms (e.g., malaria, bacterial infections)
- ❑ Provide aggressive supportive care including aggressive IV fluid resuscitation if warranted
- ❑ Assess for electrolyte abnormalities and replete
- ❑ Evaluate for evidence of bleeding and assess hematologic and coagulation parameters
- ❑ Symptomatic management of fever, nausea, vomiting, diarrhea, and abdominal pain
- ❑ Consult health department regarding other treatment options

This checklist is not intended to be comprehensive. Additions and modifications to fit local practice are encouraged.

* See 2014 Ebola Outbreak in West Africa—Case Counts or http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/case-counts.html to determine if a country has widespread Ebola transmission

** See Interim Guidance for Environmental Infection Control in Hospitals for Ebola Virus or http://www.cdc.gov/vhf/ebola/hcp/environmental-infection-control-in-hospitals.html

*** See Interim Guidance for Specimen Collection, Transport, Testing, and Submission for Persons Under Investigation for Ebola Virus Disease in the United States or http://www.cdc.gov/vhf/ebola/hcp/interim-guidance-specimen-collection-submission-patients-suspected-infection-ebola.html

Infection Control

- Early patient recognition
- Patient placement
  - Single patient rooms with private bathroom
  - Waterproof bedding cover
- Health care worker protection
  - Gloves, gown, face mask, eye protection JR1
  - Proper PPE donning and doffing (buddy system)
  - Establishment of 24/7 site manager for donning and doffing
  - Frequent hand washing
    - Before and after patient contact
    - Contact with potentially infectious materials
    - Before PPE donning and after PPE doffing JR2

Slide 17

JR1 Double check that the PPE here is consistent with updated guidance.

PPE is probably the biggest thing we're getting questions about - we probably need a whole slide or series of slides on this.
Jessica Rigler, 10/19/2014

JR2 Establishment of a 24/7 site manager is strongly encouraged. This person would be in place to oversee and observe the donning and doffing of PPE. Donning and doffing using the buddy system should also be strongly encouraged.
Jessica Rigler, 10/19/2014

How can we prevent it?

- No approved vaccine
- Take precautions if you travel to infected areas (e.g. self monitor for symptoms)
- Practice careful hygiene
- Do not handle items that may have come in contact with an infected person's blood or body fluids
- Avoid contact with bats and nonhuman primates
- Seek medical care immediately if you become ill
  - Inform doctor before you go, limit contact with others

How can we prevent it?

Healthcare workers who may be exposed should:

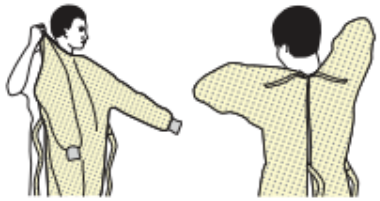
- Wear protective clothing, including masks, gloves, gowns, and eye protection.
- Practice proper infection control and sterilization measures.
- Isolate patients with Ebola from other patients.
- Avoid direct contact with the bodies of people who have died from Ebola.
- Notify health officials if you have had direct contact with the blood or body fluids

SEQUENCE FOR PUTTING ON PERSONAL PROTECTIVE EQUIPMENT (PPE)

The type of PPE used will vary based on the level of precautions required, such as standard and contact, droplet or airborne infection isolation precautions. The procedure for putting on and removing PPE should be tailored to the specific type of PPE.

1. GOWN

- Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back
- Fasten in back of neck and waist



2. MASK OR RESPIRATOR

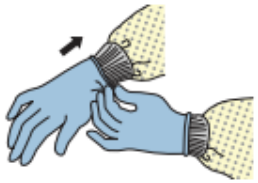
- Secure ties or elastic bands at middle of head and neck
- Fit flexible band to nose bridge
- Fit snug to face and below chin
- Fit-check respirator

3. GOGGLES OR FACE SHIELD

- Place over face and eyes and adjust to fit

4. GLOVES

- Extend to cover wrist of isolation gown



USE SAFE WORK PRACTICES TO PROTECT YOURSELF AND LIMIT THE SPREAD OF CONTAMINATION

- Keep hands away from face
- Limit surfaces touched
- Change gloves when torn or heavily contaminated
- Perform hand hygiene

CDC

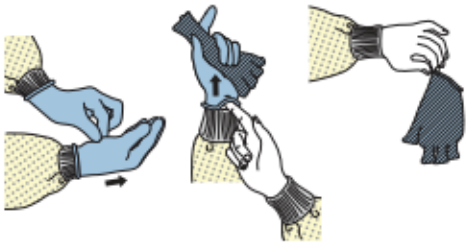
DONNING OF PPE

HOW TO SAFELY REMOVE PERSONAL PROTECTIVE EQUIPMENT (PPE)
EXAMPLE 1

There are a variety of ways to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. Here is one example. **Remove all PPE before exiting the patient room** except a respirator, if worn. Remove the respirator **after** leaving the patient room and closing the door. Remove PPE in the following sequence:

1. GLOVES

- Outside of gloves are contaminated!
- If your hands get contaminated during glove removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Using a gloved hand, grasp the palm area of the other gloved hand and peel off first glove
- Hold removed glove in gloved hand
- Slide fingers of ungloved hand under remaining glove at wrist and peel off second glove over first glove
- Discard gloves in an infectious* waste container



2. GOGGLES OR FACE SHIELD

- Outside of goggles or face shield are contaminated!
- If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Remove goggles or face shield from the back by lifting head band or ear pieces
- If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in an infectious* waste container

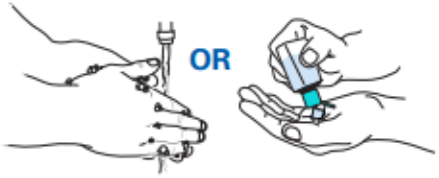
3. GOWN

- Gown front and sleeves are contaminated!
- If your hands get contaminated during gown removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Unfasten gown ties, taking care that sleeves don't contact your body when reaching for ties
- Pull gown away from neck and shoulders, touching inside of gown only
- Turn gown inside out
- Fold or roll into a bundle and discard in an infectious* waste container

4. MASK OR RESPIRATOR

- Front of mask/respirator is contaminated — DO NOT TOUCH!
- If your hands get contaminated during mask/respirator removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp bottom ties or elastics of the mask/respirator, then the ones at the top, and remove without touching the front
- Discard in an infectious* waste container

5. WASH HANDS OR USE AN ALCOHOL-BASED HAND SANITIZER IMMEDIATELY AFTER REMOVING ALL PPE



* An infectious waste container is used to dispose of PPE that is potentially contaminated with Ebola virus.

PERFORM HAND HYGIENE BETWEEN STEPS IF HANDS BECOME CONTAMINATED AND IMMEDIATELY AFTER REMOVING ALL PPE

CDC

DOFFING OF PPE

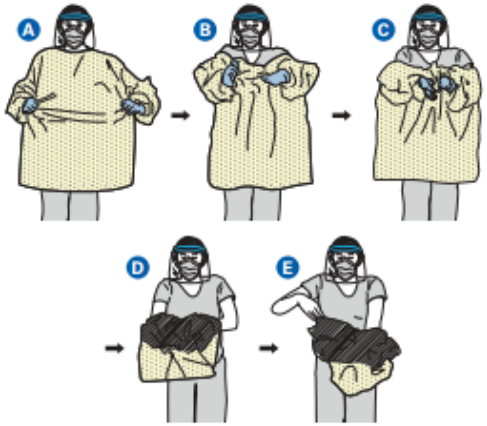
Example 1

HOW TO SAFELY REMOVE PERSONAL PROTECTIVE EQUIPMENT (PPE)
EXAMPLE 2

Here is another way to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. **Remove all PPE before exiting the patient room** except a respirator, if worn. Remove the respirator **after** leaving the patient room and closing the door. Remove PPE in the following sequence:

1. GOWN AND GLOVES

- Gown front and sleeves and the outside of gloves are contaminated!
- If your hands get contaminated during gown or glove removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp the gown in the front and pull away from your body so that the ties break, touching outside of gown only with gloved hands
- While removing the gown, fold or roll the gown inside-out into a bundle
- As you are removing the gown, peel off your gloves at the same time, only touching the inside of the gloves and gown with your bare hands. Place the gown and gloves into an infectious* waste container



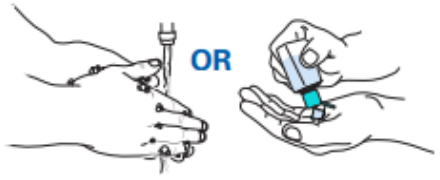
2. GOGGLES OR FACE SHIELD

- Outside of goggles or face shield are contaminated!
- If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Remove goggles or face shield from the back by lifting head band and without touching the front of the goggles or face shield
- If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in an infectious* waste container

3. MASK OR RESPIRATOR

- Front of mask/respirator is contaminated — DO NOT TOUCH!
- If your hands get contaminated during mask/respirator removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp bottom ties or elastics of the mask/respirator, then the ones at the top, and remove without touching the front
- Discard in an infectious* waste container

4. WASH HANDS OR USE AN ALCOHOL-BASED HAND SANITIZER IMMEDIATELY AFTER REMOVING ALL PPE



* An infectious waste container is used to dispose of PPE that is potentially contaminated with Ebola virus.

PERFORM HAND HYGIENE BETWEEN STEPS IF HANDS BECOME CONTAMINATED AND IMMEDIATELY AFTER REMOVING ALL PPE

CDC

DOFFING OF PPE

Example 2

Environmental Infection Control

- Daily disinfection of hard surfaces using hospital-grade disinfectant
  - Look for label for non-enveloped virus
- Avoid contamination of reusable porous surfaces
- Staff should wear recommended PPE
  - Gloves, gown, face mask, eye protection
  - Additional barriers as needed

Medical Waste Disposal

- Materials (e.g. PPE, clothes, linens, curtains, food items) should be placed in leak-proof containment
- Place in rigid waste receptacle bag
- Incinerate or autoclave—effective viral eliminator and minimizes waste
- If offsite disposal—follow U.S. DOT Hazardous Materials Regulations
  - Guidance released
- Contaminated or suspected Ebola materials should be handled with DOT guidelines
- Sanitary sewers may be used for safe disposal of Ebola patient waste

What AZ is doing?

- Responding to calls from public, hospitals, and health care providers
- Developing and disseminating education materials, toolkits, fact sheets
- Encouraging health care settings to conduct trainings and preparedness activities
- http://www.azdhs.gov/phs/oids/ebola/preparedness/

Questions?

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For more information:
www.cdc.gov/ebola